

**Title: Monumental Math****Brief Overview:**

The teacher will read the book Letters From Felix by Annette Langen and Constanza Droop, which describes world monuments. The students will compare estimated and actual heights of monuments. Students will construct a graph to compare the heights of the structures. In pairs, the students will select polygons to construct architectural structures from around the world. They will find the perimeter of the structures using a ruler. They will construct an original monument using polygons. The students will write using mathematical vocabulary to describe the strategies used to complete the tasks.

**Link to Standards:**

- **Problem Solving** Students will solve problems in mathematics including problems with practical application to the real world and problems which are solved in a cooperative atmosphere.
- **Communication** Students will demonstrate their ability to communicate mathematically. They will use graphs to communicate about collected data. They will communicate by writing a letter to persuade using mathematical language.
- **Reasoning** Students will demonstrate their ability to reason mathematically. Students will use models, known facts, properties, and relationships to explain their thinking.
- **Connections** Students will link mathematics to real-life architectural situations. They will use graphs to analyze data. They will connect mathematics to map skills.
- **Number Concepts and Relationships** Students will demonstrate their ability to apply strategies in computation, in measurement, and in problem solving. They will explore estimation strategies and apply estimation in working with measurement and problem solving.
- **Measurement and Geometry** Students will estimate and verify measurements and describe estimation strategies. They will describe characteristics of two-dimensional shapes and the effect of combining them. They will use appropriate units of measurement to determine the perimeter of polygons. Students will demonstrate connections between geometry and arithmetic operations. They will apply measurement to interdisciplinary and real-world problem solving situations.

**Grade/Level:**

Grades 3 - 4.

**Duration/Length:**

This lesson will take 6 periods (60 minutes). It will be necessary to read the book Letters From Felix to the students during a language arts period prior to the first lesson.

**Prerequisite Knowledge:**

Students should have a working knowledge of the following skills:

- Estimation
- Geometrical names and shapes of polygons
- Determining perimeter using a ruler
- Creating bar graphs

**Objectives:**

Students will:

- work cooperatively in groups.
- use polygons to create architectural structures.
- determine perimeter of architectural structures.
- collect and organize data to construct a bar graph.
- evaluate a situation and give appropriate support for their answer.
- write a persuasive letter.

**Materials/Resources/Printed Materials:**

- Book, Letters From Felix by Annette Langen and Constanza Droop
- Chart paper
- 8" x 11" graph paper
- Crayons
- Pattern blocks
- Student Resource Sheets 1 - 5
- Teacher Resource Sheets 1 - 2
- Rulers measuring in inches
- Calculators

**Development/Procedures:****Day 1:**

- Prior to this lesson, the teacher will read the book Letters From Felix.
- After reading the book, the teacher will focus on four specific monuments mentioned in the book.
- Students will estimate the height of these four monuments.
- This information will be recorded in a column on chart paper. (See Teacher Resource Sheet 1 for actual heights and as an example of the chart)
- The teacher will reveal the actual heights of the structures and record this information in a second column on the chart paper.
- Students will orally compare their estimate to the actual heights.
- Review the components of a bar graph.
- Individually, students will construct a bar graph to represent the heights of the monuments on an 8" x 11" piece of graph paper.
- Students will share their bar graphs and post them in the classroom.

**Day 2:**

- On the overhead, use Student Resource Sheet 1 to model the procedure of using polygons to construct a monument by having students make attempts to fill in the outline of the monument pictured on the transparency using pattern blocks.
- Discuss all possibilities they generate.
- Divide students into pairs.
- Distribute Student Resource Sheets 1 - 2 and pattern blocks.
- In pairs have the students use pattern blocks to cover the interior of the monuments on Resource Sheets 1 - 2.
- Trace around the pattern blocks used to fill in monument.
- Color in each traced area to match the color of the pattern blocks.
- After completing each monument, have the students write a paragraph explaining which polygons were used to create each structure.
- Collect Student Resource Sheets 1 - 2 to be redistributed tomorrow.

**Day 3:**

- Distribute Student Resource Sheets 3-4 and pattern blocks.
- In pairs have the students use pattern blocks to cover the interior of the monuments on Resource Sheets 3 - 4.
- Trace around the pattern blocks used to fill in monument.
- Color in each traced area to match the color of the pattern blocks.
- After completing each monument, have the students write a paragraph explaining which polygons were used to create each structure.
- Collect Student Resource Sheets 3 - 4 to be redistributed tomorrow.

**Day 4:**

- Review perimeter.
- Distribute Student Resource Sheets 1 - 4.
- Students will determine the perimeter of the structures pictured on Student Resource Sheets 1 - 4 in inches by using a ruler.
- A calculator may be used for finding the perimeter.
- Students will write a paragraph explaining the computation used to find the perimeter of the structures.

**Days 5 and 6:**

- Read the following vignette to the students:

The mayor of your city has decided to have a monument constructed to attract tourists to the city. He has challenged elementary school students to design an original monument using polygons. Students will use pattern blocks to create and trace a monument that people would be excited to visit. He also wants it to have a geometrical look, so he requires the students to use at least four different types of polygons in their structures. The students must give the monument an original name. The mayor would also like you to write a letter persuading him to choose your monument. He specifies that your letter must include a description of your monument using appropriate mathematical language. Be sure to include at least three good reasons why he should select your monument. (This will be done individually.)

**Performance Assessment:**

- Students will self-evaluate their work using Student Resource Sheet 5.
- The teacher will evaluate the projects and letters using the scoring rubric (Teacher Resource 2).

**Extension/Follow Up:**

- Use computer software such as Microsoft Works Draw, Clariswork Draw, LogoWriter, or MicroWorld Project Builder to recreate the polygon monuments.
- Using a world map, locate the countries and cities in which Felix visited monuments.

**Authors:**

Gretchen DeVos  
Oliver Beach Elementary  
Baltimore County, MD

Amy Cwiek  
Worthington Elementary  
Howard County, MD

## World Monuments

Name of Monument	Estimated Height (in feet)	Actual Height (in feet)
The pyramid of Khufu Cairo, Egypt		482 feet
Empire State Building New York, New York		1, 472 feet
Big Ben London, England		318 feet
Eiffel Tower Paris, France		984 feet

## **RUBRIC**

### **Questions to Ask Yourself While Scoring the Architectural Construction and Persuasive Letter:**

- Does the student use at least four different polygons?
- Does the student describe these polygons using mathematical terms?
- Does the student give a clear description of the structure?
- Does the student give at least three strong, supporting argument to persuade the audience?
- Does the student write in an organized and easily understood way?

### **Scoring Rubric:**

#### **3 Point Score:**

The creation reveals an exceptional understanding of the geometric concepts for the grade level. The writing gives strong supporting argument, clearly influencing the intended audience.

#### **2 Point Score:**

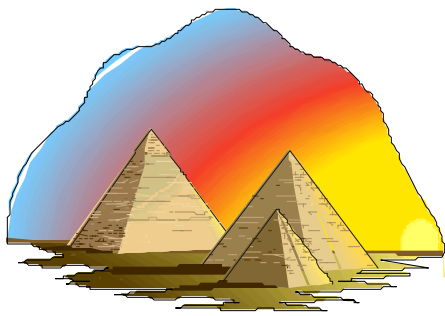
The creation shows creativity and a good understanding of geometric concepts. The writing clearly and effectively communicates with at least two supporting argument.

#### **1 Point Score:**

The student shows some understanding of the concepts in producing an original creation. The writing is incomplete or not clearly presented.

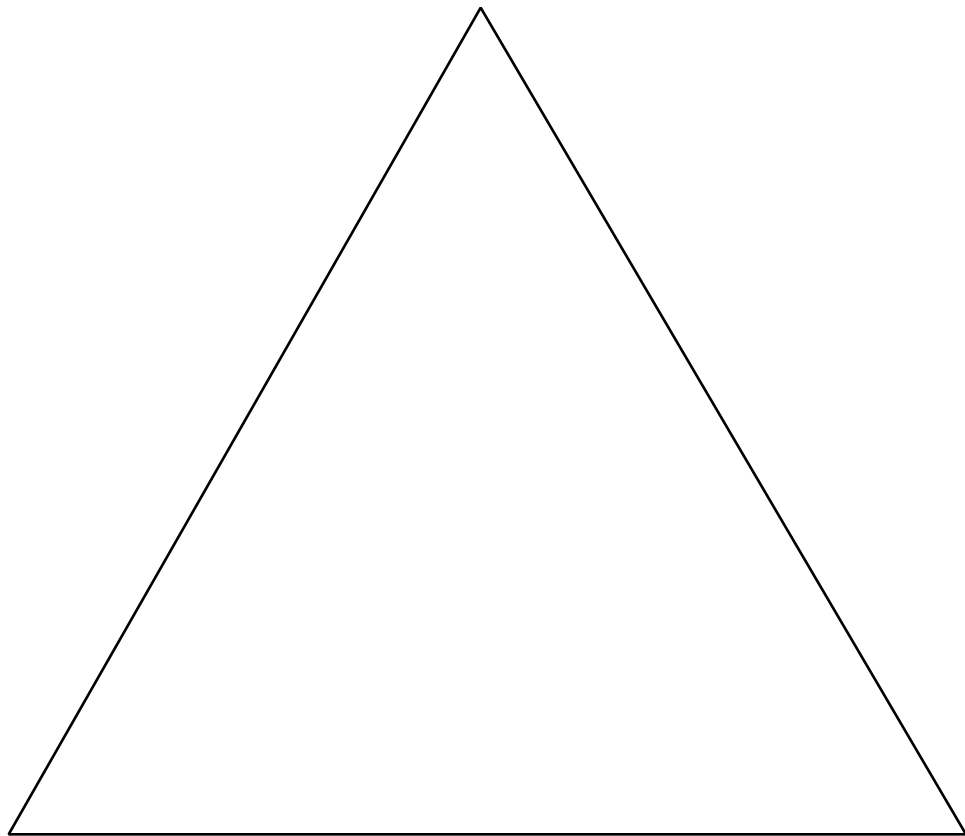
#### **0 Point Score:**

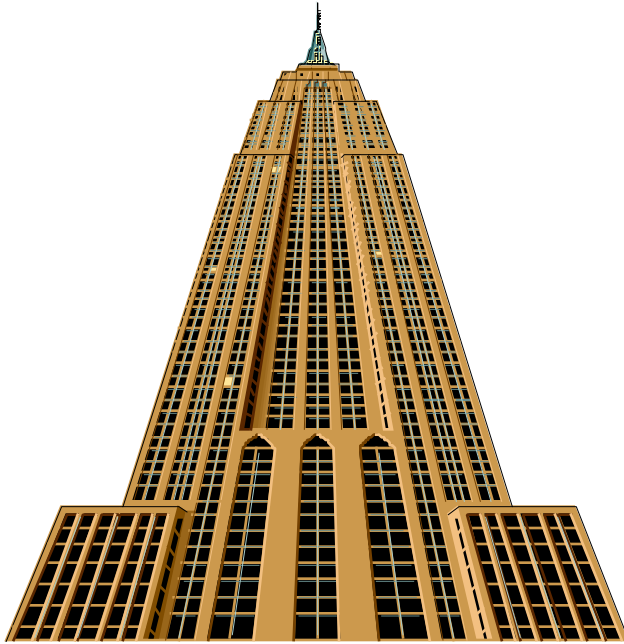
The creation is inadequate and reveals major misunderstanding of geometric concepts. The writing is not communicated well enough to be understood.



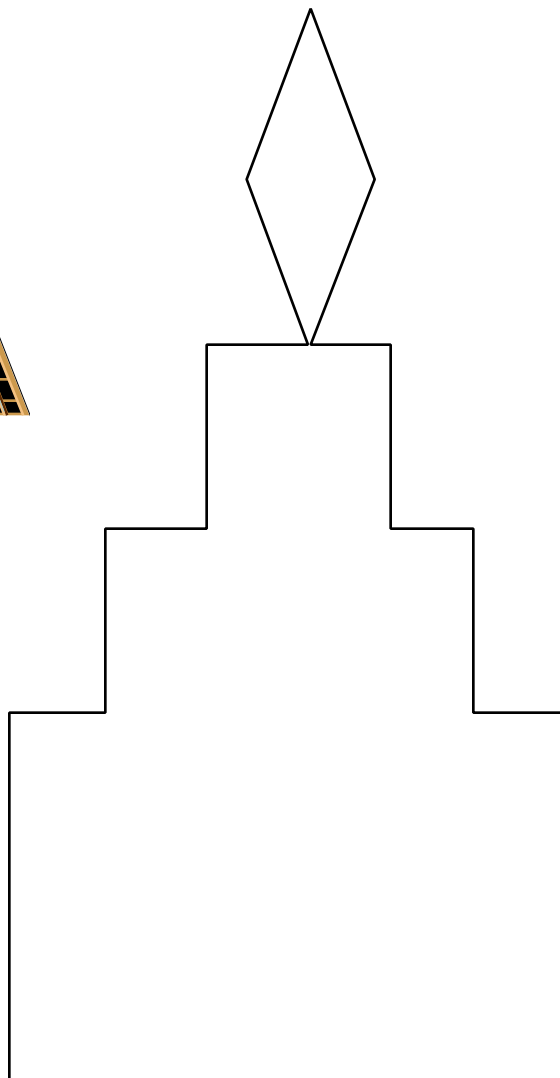
# PYRAMID OF KHUFU

Cairo, Egypt

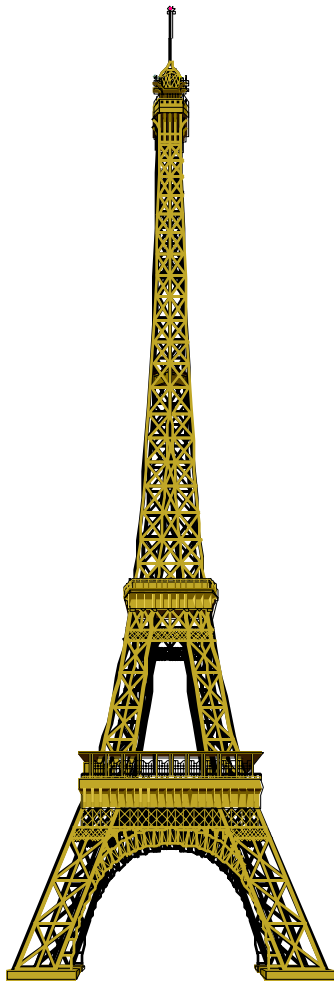




EMPIRE STATE  
BUILDING  
New York, New York

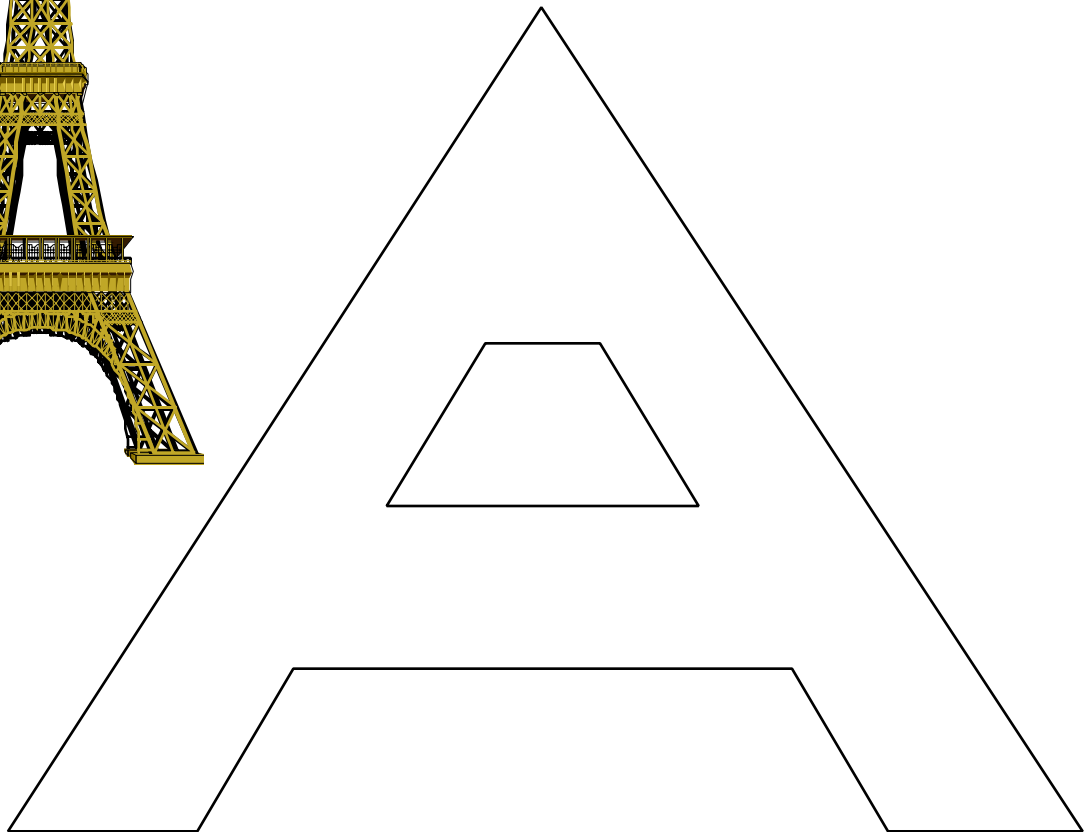






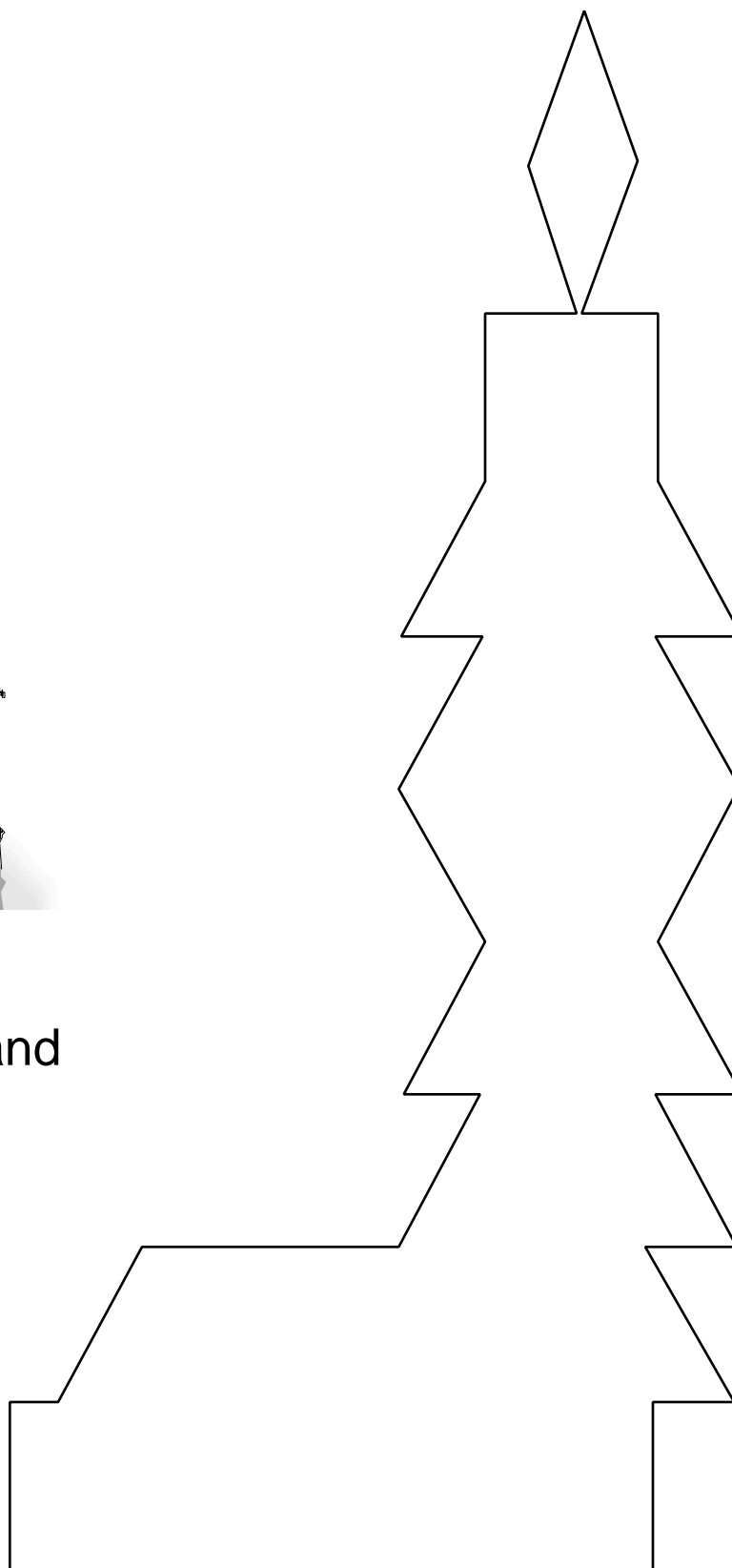
# EIFFEL TOWER

Paris, France





**BIG BEN**  
London, England



## Original Monument and Persuasive Letter Checklist

- ☐ I have used at least four different kinds of polygons in my monument.
- ☐ I have given my monument an original name.
- ☐ I have written a persuasive letter using the correct form.
- ☐ I have written my letter using mathematical terms.
- ☐ I have included at least three good reasons why my monument should be selected as the winner.